Mill River and Mill Pond Habitat Restoration Project
Stamford, Connecticut
Detailed Project Report

EXECUTIVE SUMMARY

Introduction

This report examines the feasibility of restoring anadromous fish passage, aquatic habitat, and riparian habitat on the Mill River in Stamford, Connecticut. The project area encompasses a 2.5-mile reach through downtown Stamford to the West Branch of Stamford Harbor.

The Mill River is generally considered to be the lower eight miles of Rippowam River from North Stamford Reservoir to Stamford Harbor. The Rippowam River watershed drains 37.5 square miles that extend from just north of the New York border to Long Island Sound.

Downstream of Broad Street, near Stamford's center, the Mill River is impounded behind the Main Street Dam. This 3.5-acre area of slow-flowing water is known as Mill Pond and is located within Mill River Park. Mill Pond extends 1,100 feet from the Broad Street Bridge to Main Street Dam. The pond has a uniform width of 140 feet between concrete walls, which are approximately 15 feet high (from their footings). Main Street Dam stands 9.3 feet high with a 112-foot wide spillway. Mill River Park is a nine-acre downtown common adjacent to Stamford's financial district and residential neighborhoods.

The first dam at Mill Pond was constructed in 1642 for the original gristmill in Stamford (USACE 1985). In 1922, the present Main Street Dam was constructed in the same location. Vertical concrete retaining walls were built on the eastern and western shores of the impoundment, narrowing it into a channelized shape. The dam is currently in a deteriorated state and in need of structural repairs. The Main Street Dam prevents the passage of anadromous and freshwater fish species, including river herring (the collective name for blueback herring and alewife), to spawning habitat for 4.5 miles upstream of the dam. Without access to spawning habitat, the long-term viability of the river herring population is poor.

The Mill River watershed can be characterized as moderately urban. A considerable proportion of the watershed land surface is impervious, especially within the project area near Stamford's downtown. Storm sewers from adjacent streets drain directly into Mill River. The urban development, including structural restrictions to the river, has caused the aquatic habitat of the Mill River in the project reach to be degraded. The impounded reach of river behind Main Street Dam has detained an excessive amount of sediment and is shallow and choked with invasive aquatic plants. Mill Pond had to be dredged on a number of occasions to maintain an open-water condition. In other reaches of the river

within the study area, invasive plants have spread and now dominate much of the riparian habitat and marsh wetland habitats.

Authorization

This project is authorized by Section 206 of the Water Resources Development Act of 1996, P.L. 104-303, as amended. Section 206 provides programmatic authority for the U.S. Army Corps of Engineers (USACE) to carry out aquatic ecosystem restoration projects that improve environmental quality, are in the public interest, and are cost effective. Engineering Pamphlet (EP) 1165-2-502 titled Water Resources Policies and Authorities, Ecosystem Restoration - Supporting Policy Information, provides policy guidance for Section 206 ecosystem restoration projects.

This report includes an Environmental Assessment for the proposed project. Its preparation complies with the Council on Environmental Quality and USACE regulations for implementing the National Environmental Policy Act of 1969, which requires the Federal government to consider the environmental effects of a proposed action and to consult interested agencies, groups, and the public during the planning process.

Local Sponsor

The city of Stamford is the local sponsor of this study. The city contacted the Corps in 2000 requesting that ecosystem-restoration opportunities along the lower reach of the Mill River through the city be studied by the Corps under the Section 206 Aquatic Ecosystem Restoration Program.

Project Goal

The goal of the Mill River and Mill Pond habitat restoration is to restore the aquatic and riparian resources of the river and return the Mill River to a healthy, viable, and self-maintaining river system.

Project Objectives

The following specific objectives, developed by the Corps and the city of Stamford, support the Project Goal:

- Restore instream and riparian habitat on the Mill River within the 2.5-mile reach in the city limits
- Restore anadromous fish passage to the upper reaches of Mill River
- Improve aquatic diversity and health in Mill River
- Reduce sedimentation into Mill River within the lower reach of the river
- Restore water quality to support fisheries
- Restore wetland habitat
- Improve recreational access and opportunities along the river corridor that help protect the restored habitat and provide interpretive opportunities

Formulation of Alternatives

Detailed site evaluations that involved assessing potential restoration opportunities were conducted. Locations were assessed primarily for the potential to benefit the aquatic health and function of the Mill River. Site characterization included the evaluation of 17 river cross-sections within the project area. At each location the following conditions were assessed: vegetation, erosion, channel bed substrate, wildlife, and adjacent land use. Data from each cross-section were recorded and used to evaluate sites for potential restoration.

As a result of the analysis, the following restoration measures were formulated for the lower 2.5-mile reach of the river:

- Restoration of a quarter mile of riverine and riparian habitat at the Mill Pond and Main Street Dam site and opening up anadromous fish passage to 4.5 miles (32 acres) of river habitat and restoration of riparian habitat in the park area upstream of the dam site
- Riparian habitat restoration along the river, totaling 1.53 acres, where invasive vegetation would be removed and replaced by native riparian woody and herbaceous vegetation
- Restoration of freshwater wetlands along the river reach by creating a one-acre wetland area adjacent to the river on a low-lying floodplain that now contains a parking lot at the J.M. Wright Technical School grounds
- Restoration of 0.8 acre of tidal wetlands, where invasive species, including *Phragmites*, dominate the site, by removing the invasive species, re-grading the sites to enhance tidal flushing, and planting native salt marsh vegetation
- Restoration of unrestricted river flow at Pulaski Street Bridge by removing abandoned concrete blocks and gate structures beneath the bridge, that partially block movement of anadromous fish and other aquatic species in the tidal portion of the river

Restoration of the Mill Pond and Main Street Dam site involved examining four options, treated as separate alternatives:

- No action, in which the dam and channelized, sediment-filled impoundment would remain in place
- Removal of the dam and concrete retaining walls along the river and restoring the river reach to a naturally shaped channel with a riffle pool sequence, sinuous shape, and 4 acres of riparian-vegetated floodplains along the channel
- Removal of the dam and concrete retaining walls and creating a series of stepped pools along the reach with one-foot high weirs that form still-water pools, and 4 acres of riparian-vegetated floodplains along the channel
- Construction of a fish ladder on the Main Street Dam, while leaving the dam in place, partial removal of the concrete retaining walls along the impoundment, and dredging out and widening the impoundment, and 2.9 acres of riparian habitat along the impounded reach

The restoration measures were combined in various ways to produce four alternatives, including the no-action alternative, that were analyzed in detail.

Alternative 1: No Action

No alterations to the Mill River or Mill Pond would be performed. Additionally, no actions would be performed to restore riparian areas, wetlands, saltwater marsh, and free flow along the river.

The Mill Pond landscape would remain unchanged. Sediment deposition would continue in Mill Pond, thus requiring regular dredging and maintenance by the city of Stamford. Water quality within Mill Pond would continue to be impaired. The Main Street Dam would continue to block migration and movement of anadromous and other freshwater and saltwater species that could otherwise benefit from the river. The no-action alternative would have no construction cost, but would have a high maintenance cost to maintain the existing channelized impoundment behind the dam.

Alternative 2

Alternative 2 combines the following measures:

- Removal of the Main Street Dam and concrete retaining walls and restoration of a natural stream channel through a quarter-mile reach of Mill River, thereby opening up 4.5 miles (32 acres) of riverine habitat to anadromous fish; and restoration of 4 acres of riparian habitat.
- Riparian habitat restoration along additional reaches of Mill River, totaling 1.53 acres.
- Creating a one-acre wetland area adjacent to the river at the J.M. Wright Technical School grounds.
- Restoration of 0.8 acre of tidal wetlands.
- Removal of abandoned concrete blocks and gate structures beneath the Pulaski Street Bridge.

The dam and concrete retaining walls would be removed, and banks and floodplain sculpted to restore a riparian corridor through the city park. The configuration of the natural channel design, along with the selective placement of boulders and other rock structures in the stream channel, would restore an in-stream, pool-and-riffle sequence within the park reach. The pools would be self-maintained by natural flushing during high river flows.

Alternative 3

Alternative 3 combines the following measures:

- Removal of the Main Street Dam and concrete retaining walls and creation of a series of stepped pools through a quarter-mile reach of Mill River, including 4 acres of riparian habitat restoration
- Riparian habitat restoration along the river, totaling an additional 1.53 acres
- Creating a one-acre wetland area adjacent to the river at the J.M. Wright Technical School grounds
- Restoration of 0.8 acre of tidal wetlands
- Removal of abandoned concrete blocks and gate structures beneath the Pulaski Street Bridge

A still-water landscape would be maintained in Mill River Park by establishing a series of pools connected by small cascades. Flow control structures would be constructed, and would appear to be small natural cascades. The concrete walls around the Mill Pond would be removed and replaced with vegetated banks, functioning in a manner similar to that described in Alternative 2. On-going dredging and maintenance would be required to manage sedimentation within all six pools. The operation and maintenance costs of the pools would be the responsibility of the city of Stamford and would add costs to the total project cost.

Alternative 4

Alternative 4 combines the following measures:

- Construction of a fish ladder on the Main Street Dam, while leaving the dam in place, partially removing the concrete retaining walls along the impoundment, and dredging out and widening the impoundment, including 2.9 acres of riparian habitat restoration
- Riparian habitat restoration along the river, totaling an additional 1.53 acres
- Creating a one-acre wetland area adjacent to the river at the J.M. Wright Technical School grounds
- Restoration of 0.8 acre of tidal wetlands
- Removal of abandoned concrete blocks and gate structures beneath the Pulaski Street Bridge

The Main Street Dam and the Mill Pond would be retained. The concrete walls around Mill Pond would be partially removed and the shoreline of the pond would be reshaped and regraded. The new pond slopes would be stabilized with native upland vegetation to develop a riparian buffer zone around the pond. Fish passage would be partially restored by installing a fish ladder at the Main Street Dam. On-going dredging and maintenance would be required to manage sedimentation within the pond.

Evaluation of Alternatives

The costs and anticipated environmental benefits of the restoration measures that were combined to form the alternatives were estimated and compared in incremental cost analyses. The anticipated environmental benefits were assessed by estimating the benefits to various water-related habitats, including general riverine habitat, anadromous fish habitat (including that of alewife and blueback herring), riparian corridor, native wetlands species habitat, and migratory bird habitat. Total project costs ranged from $350,000 for the no-action alternative to over $6 million for Alternative 4 with all restoration measures. Anticipated environmental benefits ranged from 3.3 habitat units (effective habitat acres) for the no action alternative to 58.7 effective habitat acres for Alternative 2 with all the additive measures.

The incremental cost analysis demonstrated that a revised version of Alternative 2 with the addition of three out of the four additive measures is the most cost-effective alternative. The revised Alternative 2 does not include the fresh water wetlands restoration measure. The additive measures along with Alternative 2 that were found to be most cost-effective are the riparian corridor restoration, removal of the Pulaski Street Bridge obstruction, and the tidal wetlands restoration.

Recommended Alternative

The revised Alternative 2 (excluding the freshwater wetlands measure) is the recommended alternative with the following restoration measures:

- Removal of the Main Street Dam and concrete retaining walls and restoration of a natural stream channel through a quarter-mile reach of Mill River, thereby opening up 4.5 miles (32 acres) of riverine habitat to anadromous fish; and restoration of 4 acres of riparian habitat within Mill River Park
- Riparian habitat restoration along the river, totaling an additional 1.53 acres
- Restoration of 0.8 acre of tidal wetlands
- Removal of abandoned concrete blocks and gate structures beneath the Pulaski Street Bridge

The Mill River and Mill Pond Habitat Restoration Project would remove the Main Street Dam and the concrete retaining walls around the Mill Pond. Removing these structures would create an opportunity to restore the river channel and floodplain to Mill River Park and open 4.5 miles of the Mill River for fish passage. In total, 5.2 miles of river, from the Pulaski Street Bridge, would have restored fish passage. The restored channel would effectively transport sediment and nutrients, and restore aquatic, riverbank, and floodplain habitats.

The tidal wetlands restoration measures would restore 0.8 acre of tidal marsh habitat and contribute to restoration of marsh habitat along the Connecticut coastline. Restoring tidal wetlands would improve foraging, spawning, and sheltering habitat. The riparian habitat restoration would further enhance the productivity of the Mill River corridor by re-

introducing native plant species, removing invasive plants and debris, stabilizing riverbanks, and improving the riverine habitat with shade and additional shelter and food sources. This restoration would also provide benefits of attenuating floods, removing nutrients, and improving water quality.

Habitat improvements would support local biodiversity and improve the Mill River ecosystem's health. A contiguous system of river parks, open space, and protected habitat, interlaced with a trail network, would restore a wildlife corridor and provide recreational opportunities for the residents of Stamford.

Removal of the obstruction beneath the Pulaski Street Bridge would increase movement of aquatic species within the tidal zone of the river and further improve anadromous fish passage up the river when coupled with removal of the Main Street Dam.

In accordance with Corps regulations, the recommended plan represents a cost-effective plan that reasonably optimizes environmental benefits that are in the national interest. The total project cost is estimated at $5,571,000, including planning and design costs totaling $730,000, total construction costs of $4,525,000, and real estate requirements valued at $261,000. Recreation-related construction costs of $376,000 are included in the total construction cost. Additionally, operations and maintenance costs are estimated at $7,000 per year for a 50-year life of the project. This alternative provides an aquatic habitat output of 53.9 habitat units, measured as effective habitat acres, within the study area.

Sponsor's Responsibilities

The city of Stamford, Connecticut, is the non-Federal sponsor for the Mill River and Mill Pond Habitat Restoration Project. As the local sponsor, the city of Stamford has agreed to fulfill the local cooperation requirements. A financing plan, or documentation of financial capability, is required for any non-Federal sponsor prior to execution of a Project Cooperation Agreement.

Project Implementation

As the local sponsor, the city of Stamford is required to provide 35% of total project costs relating to ecosystem restoration and 50% of recreation-related construction costs. Federal costs are estimated at $3,565,000. Stamford's cost share is estimated at a total of $2,006,000, including $261,000 in contributed value of real estate provided by the city. The sponsor is also responsible for 100% of continuing operations and maintenance costs, as well as any needed repair, rehabilitation, and replacement costs on improvements related to the project. Project sponsorship will be formalized with the execution of the Project Cooperation Agreement, which is expected in the 2005 calendar year. Construction is forecast to begin in 2005 and be completed in November 2006.